

CARLO BERTERO (1789–1831) IN THE NEW WORLD

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ABSTRACT

Carlo Giuseppe Bertero (1789–1831) is, among the famous Italian botanical collectors that contributed toward the knowledge of New World flora, the one who collected and travelled the most. Bertero gathered a large number of specimens, which were in turn distributed to many of his correspondents, and are now present in many herbaria worldwide. During his travels he also collected seeds, which he sent to numerous botanists, contributing toward the collections of private and public gardens. Several hundreds of his botanical collections turned out to be plants unknown to science, which were in turn described by many of his contemporary European botanists. The botanical work of Carlo Bertero in Italy has already been extensively treated by many specialists. Nevertheless, his botanical expeditions and collections in the New World have never been completely studied, although partial reports have already been published. Such studies need further investigations as new data have been recently obtained through correspondence, field books and herbarium label data in order to reconstruct the itineraries and the chronological sequence of Bertero's first expedition to the Antilles and northern Colombia (1816–1821), and his second expedition to Chile (1827–1830), Juan Fernández Islands (1829) and Tahiti (1830–1831). This preliminary study is part of an ongoing project that will produce a complete biography of Carlo Bertero and a comprehensive account of his botanical work in the New World and the South Pacific, that will be published in the near future (Delprete, Forneris & Pistarino, in progress).

KEY WORDS: Carlo Bertero (1789–1831), Giovanni Battista Balbis (1765–1831), Luigi Colla (1766–1848); biography, bibliography, botanical collections, botanical explorations, itineraries; Greater Antilles, Guadalupe, Puerto Rico, Santo Domingo, Jamaica, South America, Colombia, Chile, Juan Fernandez Islands, Tahiti, Society Islands.

RESUMEN

Carlo Giuseppe Bertero (1789–1831) es, entre los famosos colectores botánicos italianos que contribuyeron al conocimiento de la flora del Nuevo Mundo, el que más viajó y colectó. Bertero acopió un gran número de especímenes, que fueron distribuidos a la mayoría de sus correspondientes y que ahora están conservados en muchos herbarios de todo el mundo. Durante sus viajes recolectó también semillas, que mandó a muchos botánicos, contribuyendo a las colecciones de jardines públicos y privados. Varios centenares de sus especímenes se revelaron como especies desconocidas para la ciencia y fueron descritas por varios botánicos europeos contemporáneos. El trabajo botánico de Carlo

Bertero en Italia fue extensamente tratado por muchos especialistas. Sin embargo, sus expediciones y colecciones en el Nuevo Mundo nunca fueron completamente estudiadas, aunque se publicaron algunos reportes parciales. Estos estudios necesitan de ulterior investigación, puesto que fueron obtenidos nuevos datos recientemente a través de su correspondencia, cuadernos de campo y etiquetas de herbario, en el intento por reconstruir los itinerarios y la secuencia cronológica de su primera expedición a Las Antillas y norte de Colombia (1816–1821) y su segunda expedición a Chile (1827–1830), Islas de Juan Fernández (1829) y Tahití (1830–1831). Este estudio preliminar es parte de un proyecto en curso que producirá una biografía completa de Carlo Bertero y una relación comprensiva de su trabajo botánico en el Nuevo Mundo y en el Pacífico Sur, que será publicado en un futuro próximo (Delprete, Forneris & Pistarino, en curso).

PALABRAS CLAVE: Carlo Bertero (1789–1831), Giovanni Battista Balbis (1765–1831), Luigi Colla (1766–1848); biografía, bibliografía, colecciones botánicas, exploraciones botánicas, itinerarios; Antillas Mayores, Guadalupe, Puerto Rico, Santo Domingo, Jamaica, América del Sur, Colombia, Chile, Islas de Juan Fernández, Tahiti, Islas de la Sociedad.

Among the many Italian naturalists who explored the New World, Carlo Giuseppe Bertero (1789–1831) stands out as one of the early collectors who visited little-known or unexplored areas, and for the impressive amount of material that he collected in these regions. The historical, floristic and ecological importance of Bertero's collections is also that they were made in areas that are nowadays almost entirely destroyed, particularly in the Greater Antilles, Chile, and in the Juan Fernández Islands. He engaged two major trips, covering his travel expenses as a medical doctor: the first in the Antilles and the Caribbean coast of Colombia (1816–1821), and the second in central Chile (1827–1830), Juan Fernández Islands (1829) and Tahiti (1830–1831). The bulk of Bertero's collections was shipped to Giovanni Balbis (1765–1831) and Luigi Colla (1766–1848; cf. Delprete 2000), both resident at Torino, and were in turn distributed to many major European herbaria (and now partially present in many North and South American institutions), and his seeds and living material were sent to several European botanical gardens (Spin 1823; Parlato 1841; Visiani 1855).

A considerable portion of his collections turned out to be genera and species unknown to science, and were described by many contemporary botanists. Most of Bertero's new taxa from the Caribbean region were primarily described by: A.P. de Candolle (1823–73) and Kunth (1833–50) and those from Chile by Moris (1831, 1832, 1833, 1834, 1835), A. de Jussieu (1832), and Colla (1824, 1834, 1835, 1837) among many others (i.e., Balbis, Decaisne, Delessert, Delile, Guillemain, Hooker & Arnott, Montagne, Nees, Philippi, Sprengel, Trinius, Urban and Vignolo-Lutati). Four generic names (*Berteroa* DC., *Berteroella* O.E. Schultz, *Berteromyces* Ciferri and *Terobera* Steud.) and more than 300 specific epithets were dedicated to Bertero (Mattiolo 1932a, 1932b). The correct orthography of specific epithets honoring Bertero has been discussed in Stuessy and Marticorena (1990) and Kartesz and Gandhi (1993). At last, a reef discovered a few years after Bertero's death, was named after him (Bertero's Reef, also Récif Ebrill, Tuamotu Archipelago, 22°40' South, 133°30' West, Pacific Ocean) by J.A.

Morenhout, the Consul of the United States in the Pacific Islands and his last travel companion in the Society Islands.

Bertero also contributed greatly to the knowledge of the Italian flora through his collections before and in-between his two American expeditions. Many authors have focused their work on Bertero's botanical collections in Piedmont (northwestern Italy), which are preserved at TO, in the *Herbarium Pedemontanum* (TO-HP; Re 1827; Bertoloni 1833-54; Colla 1833-37; Burnat 1883; Ferraris & Ferro 1904; Mattiolo 1929; Castiglioni 1931; Steinberg 1971; Vignolo-Lutati 1926, 1927, 1928, 1929, 1932, 1950, 1960; Forneris & Pistarino 1987-88; Forneris & Pistarino 1991; Forneris et al. 1992).

Several authors have dedicated their attention to Bertero's life and work in the Americas (e.g., Vignolo-Lutati 1955, 1956), but the subject has never been treated extensively. Therefore, it has become necessary to start a major project on Bertero's biography and botanical expeditions in the New World (Delprete et al. 2000; Delprete, Forneris & Pistarino, in progress), with the main goals to catalogue Bertero's itineraries and collections, and to produce a study on his life, dedicated to botany, until his premature death caused by a shipwreck in the high seas of the Pacific Ocean. The goal of the present article is to introduce botanists and historians who are interested in the floras of the Americas (and the Society Islands) to Bertero's major accomplishments, and to his dedication and passion for botanical research that lasted until the last day of his short life.

BIBLIOGRAPHIC SOURCES

Bibliographic information has been compiled from the works of many authors who in various occasions have mentioned Bertero's work and life in the New World (Guillemin 1830; Anonymous 1831, 1833, 1834; Hooker & Arnott 1833; Colla 1832, 1839; Astegiano 1857; Candolle 1862; Fournier 1876; Molinari 1880; Urban 1902; Mattiolo 1930, 1932a, 1932b; Gunckel 1931; Looser 1931; Mussa 1931; Vignolo-Lutati 1931a, 1931b, 1951, 1955, 1956; Pichi Sermolli 1951, 1952, 1988; Lanjouw & Stafleu 1954; Perez-Arbeláez 1970; Piovano 1970; Stafleu 1974; Stafleu & Cowan 1976; Del Vitto 1986; Montacchini et al. 1986; Brondino 1989; Forneris et al. 1989; Molinaro 1989; Pistarino & Clemente 1989; Pistarino et al. 1989; Stafleu & Mennega 1993).

Among the works that focused, at least in part, on Bertero's American expeditions, should be mentioned the *Elogio storico dell'Accademico Dottore Carlo Bertero* published by Colla (1839), Bertero's friend and colleague, and the works of Vignolo-Lutati (1955, 1956) and Pistarino et al. (1989). Colla's *Elogio* is particularly important in this biographic project, because he was one of Bertero's dearest friends, and also because it is based on the many letters, with many biographical notes, that were written to him by Bertero. Vignolo-Lutati (1955) studied Bertero's American collections preserved at TO-HG, from the Balbis and

Colla herbaria (for a total of 2,248 taxa), with scholarly work of analysis and organisation [the taxa are arranged according to the Durand (1888) classification, as the specimens still are at TO-HG]. Pistarino et al. (1989) represents the first step of the Bertero Project, of which this article is the logical continuation. Another important source of information is contained in the letters exchanged among Bertero, Colla and Balbis, which are united into 22 volumes of *Corrispondenza botanica e amicale* [Botanical and personal correspondence] and is preserved at the *Biblioteca Reale di Torino* [Royal Library of Turin]. These letters represent an extremely important documentation in the reconstruction of the stages of life and the scientific activities of Bertero. A few letters are also preserved at the *Accademia delle Scienze di Torino* [Academy of Sciences of Turin] and at the *Biblioteca Civica di Torino* [Civic Library of Turin]. Nevertheless, Turin is not the only city where Bertero's letters can be found, mostly because he kept close epistolary relationships with many botanists of his time (Anonymous 1831).

Finally, the most important document examined in this study was Bertero's field book of his first trip to the Antilles and northern Colombia (Fig. 2). This precious document, currently preserved at the Library of the Department of Plant Biology of the University of Turin, is a result of 14 field books that were later bound together, to form a book of 1,095 pages, where he described 1,746 collections. The manuscript is in Latin, in Bertero's minute handwriting, and with exhaustive descriptions (sometimes more than one page long), habitats, localities, common names, local medicinal uses, and sometimes augmented by accurate discussions on systematics, taxonomy and nomenclature. In addition, many pages of the manuscript are enriched by Bertero's pencil drawings of morphological details that are often fundamental for the determination of the species collected. This manuscript was donated by Balbis to Augustin Pyramus de Candolle [who used (and sometimes copied) Bertero's descriptions of the Caribbean taxa and published them in the *Prodromus*, 1823–73], and was later returned by Alphonse de Candolle (Augustin's son) to Turin in 1857 (Vignolo-Lutati 1931a; Mattiolo 1932a). Unfortunately, Bertero's field books of his trips in Chile, Juan Fernández Islands and Tahiti have been lost.

BERTERO'S LIFE, TRAVELS, AND BOTANICAL COLLECTIONS

Bertero's Early Years In Europe

Carlo Giuseppe Bertero (Fig. 1) was born on 14 October 1789, in Santa Vittoria d'Alba, a small town in the hilly region of Langhe, about 60 km South of Turin, Piedmont region, northwestern Italy. He studied medicine and natural history at the University of Turin, and later studied botany under the famous botanist Giovanni Battista Balbis, and finally received his Laurea in Medicine in 1811. His doctoral dissertation clearly shows the first signs of his botanical inclina-



FIG. 1. Portrait of Carlo Giuseppe Bertero, with a reproduction of his signature at the bottom of the page.

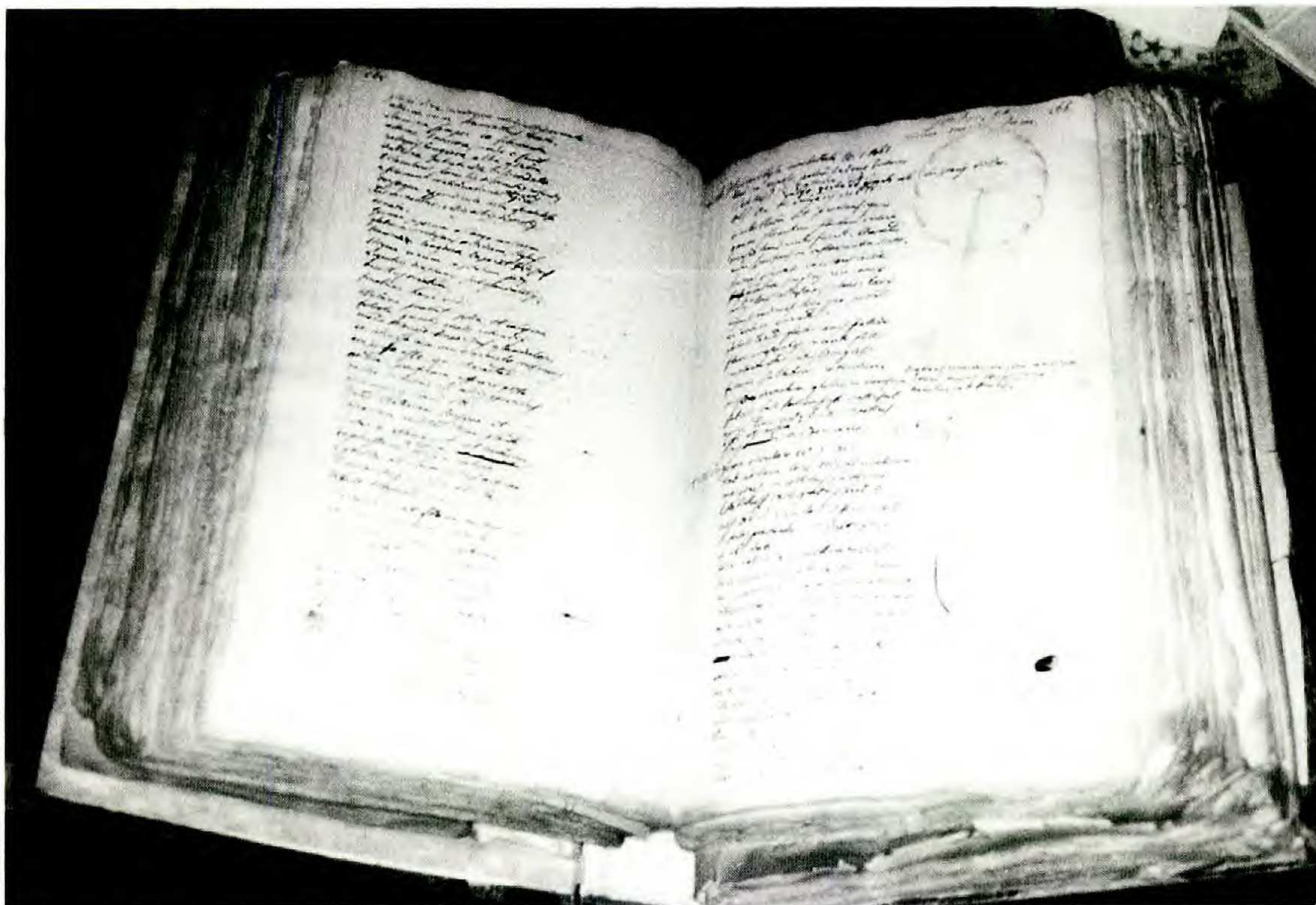


FIG. 2. Photograph of Bertero's field book, compiled by binding his notebooks (14 fascicles with collections numbers, localities, plant descriptions, drawings, etc.) written during his Caribbean expedition (1816–1821).

tion (Bertero, 1811). While studying for his medical degree, he was a frequent visitor to the *Orto Botanico*, and his botanical interests are shown in a letter [hereafter, between brackets are indicated the locality and date of the letters sent by Bertero] (Alba [Piedmont], 21 August 1809) where he asked his botanical master Balbis to find him a copy of the *Flora Pedemontana* of Allioni (1785). In these early years of formation, Bertero strengthened his own botanical knowledge and built the foundation of a strong friendship with Balbis, as is demonstrated in their frequent letters.

In the following years, Bertero proved to be quite successful in the medical sciences, but he refused to continue his medical studies at the *Collegio di Medicina* [College of Medicine], and started eagerly botanizing in the hills and valleys of Piedmont instead. The epistolary relationship between Bertero and Balbis continued strongly through this period, even when the latter moved to Pavia (Torino, 24 May 1815). In these letters, Bertero communicated his frequent botanical collections (Alba, 1 and 7 January 1816, and 6 March 1816) and put his own herbarium at the complete disposition of Balbis (Alba, 7 June 1816) and offered (Alba, 18 March 1816) to help him in the recompilation of the indexes of Willdenow's *Enumeratio plantarum* (1806–1816) and *Species plantarum* (1797–

1825), which were recompiled by Balbis because a great number of taxa were missing in both works.

Before moving to France, Bertero was living in his family home in the small town of Santa Vittoria d'Alba. The frustration caused by the increasing isolation and his desire to be part of the academic world stimulated him to search for objectives outside of Italy. He condensed these feelings of dissatisfaction in a sentence included in a letter that he sent to Balbis: "... Ce qui me console encore c'est que tou[s] mes parents sont persuadés qu'Alba n'est [pas] faite pour moi, n'ayant aucune ressource dans ce pays" [what consoles me is that all my relatives are persuaded that Alba is not made for me, there are no resources in this town (Alba, 7 June 1816)]. In July 1816, with the help of Balbis, who had connections with many European scientific personalities, Bertero moved to Paris. In this city, he had the occasion to meet many famous contemporary botanists as, for example, René Louiche Desfontaines (Paris, 20 July 1816), Jean Louis Loiseleur-Deslongchamps, and Christiaan Hendrik Persoon (Le Havre, 5 August 1816). The Parisian cultural and scientific environment, the study of herbaria containing tropical collections and the frequent visits to the *Jardin des Plantes* contributed to Bertero's rapidly increasing knowledge. It was in this exciting cultural atmosphere, and with the help of Christiaan Persoon (1761–1836), that Bertero decided to study the flora of the Antilles.

Bertero's Expedition to the Antilles and Colombia (1816–1821)

General Foujaz de Saint Fond, captain of the ship *Guadalupe*, offered an invitation, extended through Persoon, to Bertero to travel on his boat as ship doctor; an offer that he gladly accepted. On August 1816, Bertero departed, on the *Guadalupe*, from the port of Le Havre, with destination to the West Indies. During the trip, the entire crew was infected with yellow fever, and Bertero succeeded in saving most of them, so that at the arrival in Martinique he was welcomed with extraordinary honors.

In Martinique, Bertero was much appreciated as a medical doctor and as naturalist, to the point that he was offered the direction of the local museum of natural history and of the botanical garden. This position Bertero did not accept because he wanted to be free for his botanical explorations. The earliest letter examined documenting his stay in Guadeloupe was dated 31 December 1816, where he affirmed to have collected more than 350 species and to have prepared 100 packages of seeds to be sent to Europe (Pistarino & Forneris 1992).

During this expedition that lasted nearly five years, Bertero visited Guadeloupe in 1816–1818, Saint Thomas in 1818, Puerto Rico in 1818–1819, Santo Domingo (Río Yaqui, etc.), Haiti (Jacmel, Les Cayes, Port-au-Prince, etc.) in 1819–1820, and Colombia (Santa Marta, Barranquilla, Mompós, and the lower Río Magdalena) in 1820–1821. Because of ongoing revolution in Colombia, he returned to Europe, with a short stay in Jamaica, in 1821.

During his stay in the Caribbean region, the correspondence of Bertero with Balbis and Colla is occasional; this may be related to the difficulties of delivering the mail from such remote places to Europe. The letters that we have studied were in chronological order as follows: France: Paris (20 July 1816), Le Havre (5 August 1816); Guadeloupe: Pointe-à-Pitre (31 December 1816), Grande Terre (30 January 1817), Petit Canal (30 May 1817, 15 August 1817, 1 September 1817, 13 May 1818), Pointe-à-Pitre (10 July 1818); Saint Thomas (30 July 1818); Puerto Rico: Patillas (15 January 1819); Hispaniola: Santo Domingo (4 November 1819); Jamaica: Kingston (2 June 1821); France: Paris (3 October 1821).

In several letters (Petit Canal, 1 September 1817; Pointe-à-Pitre, 10 July 1818; Santo Domingo, 4 November 1819), Bertero mentioned several trips that he planned but never realised. Colla (1839), based on the letter of 15 August 1817 from Petit Canal, referred to an itinerary that Bertero planned (and Colla assumed he realised) from Guadeloupe to Martinique, Trinidad, Tobago and to the mouth of the Orinoco River (Venezuela), to which some other authors have referred in the reconstruction of the itinerary of Bertero's first trip (Astegiano 1857; Molinari 1880). Most likely this trip never took place, and no collections, field books, nor correspondence from any of these areas has ever been found. Urban (1902), studying Bertero's herbarium specimens, was able to make some corrections to the inexact information supplied by Colla about Bertero's trip to the Antilles and northern South America. Urban's corrections and additions were later followed by Mattiolo (1932a, 1932b) and Spada Sermonti (1967). Both specimen labels and correspondence enable us to construct a fairly accurate itinerary of Bertero's first trip (Fig. 3). Also, Table 1 summarises the localities and the periods in which Bertero made botanical collections in the Antilles and in Colombia. This table has been constructed based on data obtained from the above-cited letters, Bertero's field book, and the references published by Vignolo-Lutati (1955), who in turn extracted this information from TO-HG and Bertero's field book.

The botanical research conducted by Bertero in the Antilles took place with many difficulties. The various problems that he referred to in several letters were mostly the amount of time that he had to dedicate to his medical practice, necessary to cover his travel and living expenses, and by the few references available to him for the identification of his own collections (Pointe-à-Pitre, 31 December 1816; Petit Canal, 30 May 1817, and 1 September 1817). In those days Curt Sprengel's (1827) and A.P. de Candolle's (1823–1873) treatments were not yet available; in fact, these texts were published later and were based on many of Bertero's neotropical collections.

He stayed in the West Indies (Jamaica) until the end of July 1821, extremely saddened to have to abandon those beautiful lands but, at the same time, anxious to meet again his relatives after his trip of nearly five years. But what made Bertero even more anxious about his return to Piedmont was the possibility of

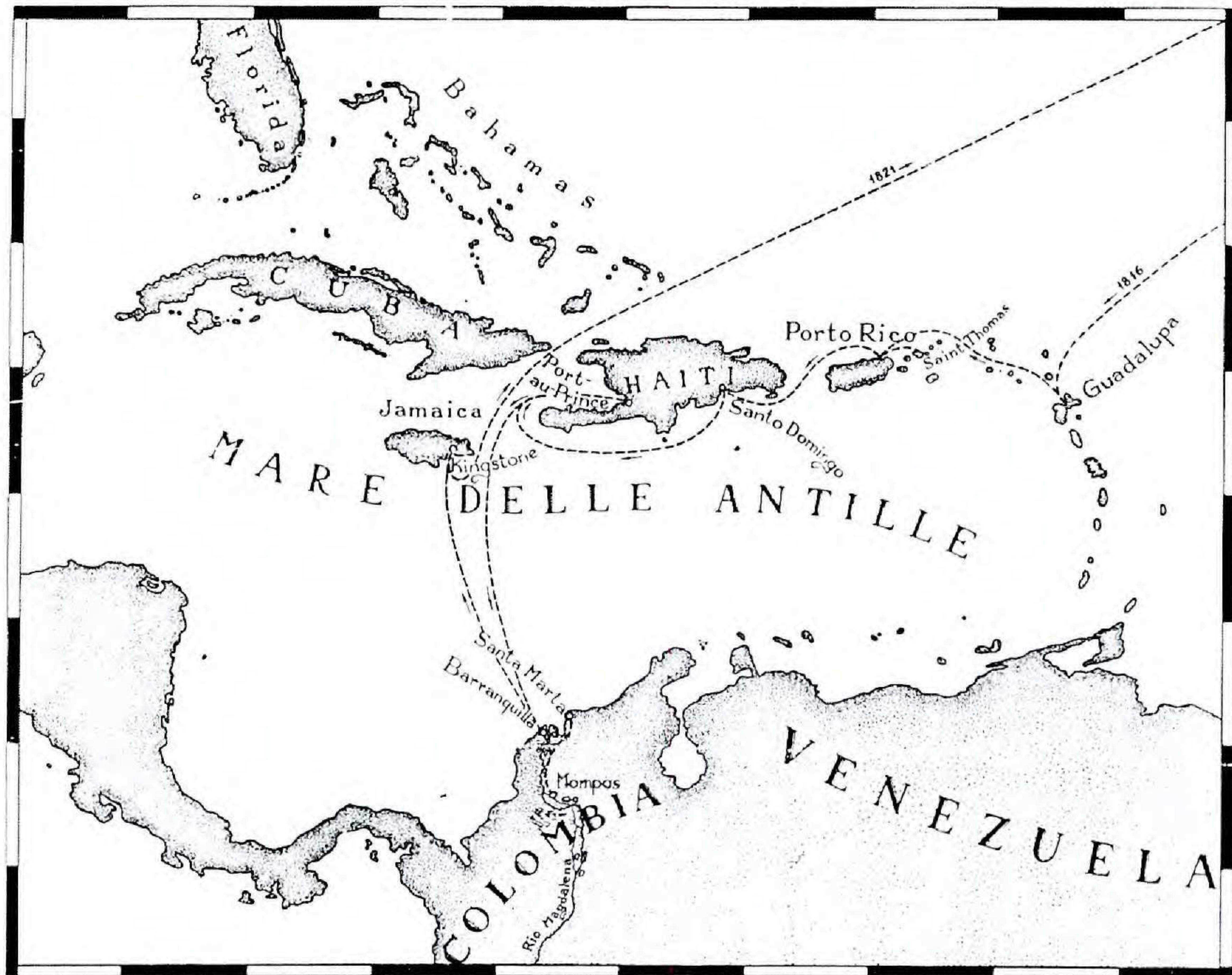


FIG. 3. Map of Bertero's itinerary in the Antilles and Colombia (1816–1821). Reproduced with permission from Molinaro (1989).

meeting Balbis, at Turin, in order to study and determine his new collections, discuss his botanical observations, and update himself on the new publications which had come out during his absence (Kingston, 2 June 1821).

Bertero's collections from the West Indies and Colombia were received by Balbis, who, after a rapid determination by Curt Sprengel (at Halle, Germany), distributed them to various botanists that specialised on Caribbean flora and to several European herbaria. The most substantial set of Bertero's Caribbean collections is preserved at TO-HG, at the University of Turin, which arrived here from Balbis' and Colla's personal herbaria, which was carefully studied by Vignolo-Lutati (1955) and is of cardinal importance in systematic, taxonomic, floristic and monographic studies of the genera occurring in the Greater Antilles (e.g., Anderson 1986; Delprete 1995; Delprete et al. 2000). Duplicate sets of Bertero's Caribbean collections were sent to A.P. de Candolle (G-DC), K. Kunth (B, destroyed), K. Krug (B, destroyed), K. Sprengel (transferred to Urban, B, destroyed), and A. Bertoloni (BOLO; Forneris et al. 1992), to the institutional herbaria of Berlin (B, destroyed), Paris (P), Munich (M), Würzburg (WB), Florence (FI), and additional Bertero's Caribbean specimens are also found at B, FI,

TABLE 1. Summary of Bertero's field book of his trip to the Antilles and northern Colombia (1816–1821), organized by localities, fascicle numbers (notebooks successively numbered by Bertero; fascicle numbers followed by * were pencilled by Vignolo-Lutati), dates, collection numbers, and page numbers of the manuscript.

Fascicles numbers	Collecting dates	Collection numbers	Book pages
<i>In plantas Guadalupenses animadversiones</i> [Guadalupe]			
primus	1816–17	1–212	1–92
secundus	1817	213–412	93–184
tertius	1817	413–587	185–264
quartus	1817–18	588–786	265–360
quintus	1818	787–1079	361–448
sextus	1818	1080–1171	449–529
<i>Stirpium portoricensium historia</i> [Puerto Rico]			
septimus	1818	1172–1232	530–597
octavus	1818	1233–1348	598–685
<i>Plantae domingenses</i> [Santo Domingo, Dominican Republic]			
Nonus* & decimus*	1819–20	1349–1561	686–905
<i>Stirpium ad flumen Magdalena in Amer. merid. lectarum descriptiones</i> [Río Magdalena, Colombia]			
undecimus	1820	1562–1591	906–937
<i>Stirpes in prov. S. Marthae Continent Amer. Australi lectae</i> [Santa Marta Province, Colombia]			
duodecimus	1820–21	1592–1630	938–993
decimustertius	1821	1631–1723	994–1069
[Plants collected in Jamaica, without title in front page]			
decimus quartus*	1821	1724–1747	1070–1082

* The numbers of these fascicles were pencilled by Vignolo-Lutati.

HAL, L, M, MEDEL, MO, MPU, NY, P, P-JU, S, WB and probably some other institutions.

At last, Bertero also collected many samples of seeds in the Greater Antilles and sent them to Balbis, who had active exchange with several European botanical gardens (e.g., Delprete 1995). In many letters preserved at the Biblioteca Reale di Torino it is possible to ascertain the frequent requests from various botanical gardens of the precious seeds collected by Bertero in the West Indies.

Bertero's Return to Europe (1821–1827)

In 1821 Bertero arrived in Paris, and from there he returned to Italy, where he resumed his floristic explorations in Piedmont. In 1825 he was assigned to assist Giuseppe Giacinto Moris (1796–1869) in botanical collections in Sardinia (Moris 1837; Colla 1839; Mussa 1911; Mattiolo 1929; Pistarino et al. 1989), but this collaboration was interrupted. He returned to Santa Vittoria d'Alba and

for some time he continued botanical collections in Piedmont, as documented by his collection in the Gesso Valley of 1826.

Returning to Santa Vittoria d'Alba, Bertero's feelings of frustration, caused by the isolation from cultural centers and the monotony of small town life, were eventually expressed in a letter to Balbis (Alba, 3 March 1826): "... Il faudrait être au courant de la science, avoir des livres en quantité et des correspondants; je suis loin de tout cela, et je me trouve, malgré moi, forcé de rester dans cette inaction" [I need to be up to date with science, and to have books and correspondents; I am far from all that, and I found myself, against my will, forced into this inaction (Alba, 3 March 1826)]. The emptiness left by the death of his much beloved mother, the only bond that could have kept him in Piedmont (Torino, 18 April 1827), made Bertero's desire for new travels irrepressible. In 1827 he returned to Paris, and followed the suggestions made by A.P. de Candolle and B. Delessert (Paris, 25 July 1827) to choose Chile as his next goal, a land that was botanically poorly known at that time. In preparation for this expedition, he consulted the Joseph Dombey herbarium (P), constituted by material collected in southwestern South America with Hippolito Ruiz and José Pavón (Steele 1964).

In several letters from Paris (e.g., 18 August 1827), Bertero communicated to Balbis to be literally harassed by scientists, who masked their interests behind apparent manifestations of friendship in order to gain the favor of receiving a set of his future South American collections. Candolle himself offered him money in exchange for a set of his future Chilean collections, an offer that Bertero refused with disdain. Nevertheless, in his correspondence, Bertero declared his interest in sharing his collections not only with his colleagues Balbis and Colla, but also with A.P. de Candolle and several other botanists. At the same time, Bertero was conscious of the ruthless attitude of some botanists to appropriate materials and results from their colleagues. As a consequence, he considered suitable the offer of Candolle to include the descriptions of his newly found Caribbean taxa in the *Prodromus*, before they would be published by others. Candolle published several hundreds new species based on Bertero's detailed descriptions (sometimes copying them literally) of the Caribbean plants he observed and collected. The field book was returned to the Turin Herbarium 16 years after Bertero's death, by Alphonse de Candolle (A.P. de Candolle's son), with the following inscription on the front page (translated from French): "Bertero, botanical manuscripts, previously donated by Balbis to Aug. Pyramus de Candolle, with the agreement of Bertero, transmitted in 1857 to the Botanical Museum of Turin by Alphonse de Candolle, as a token of recognition for a present that he gave me of dry plants from Brazil. Geneva, 27 October 1857, Alph. de Candolle" (Fig. 4).

In addition, Bertero planned to publish the new taxa that would result from his future South American collections, before they would be supplanted by con-

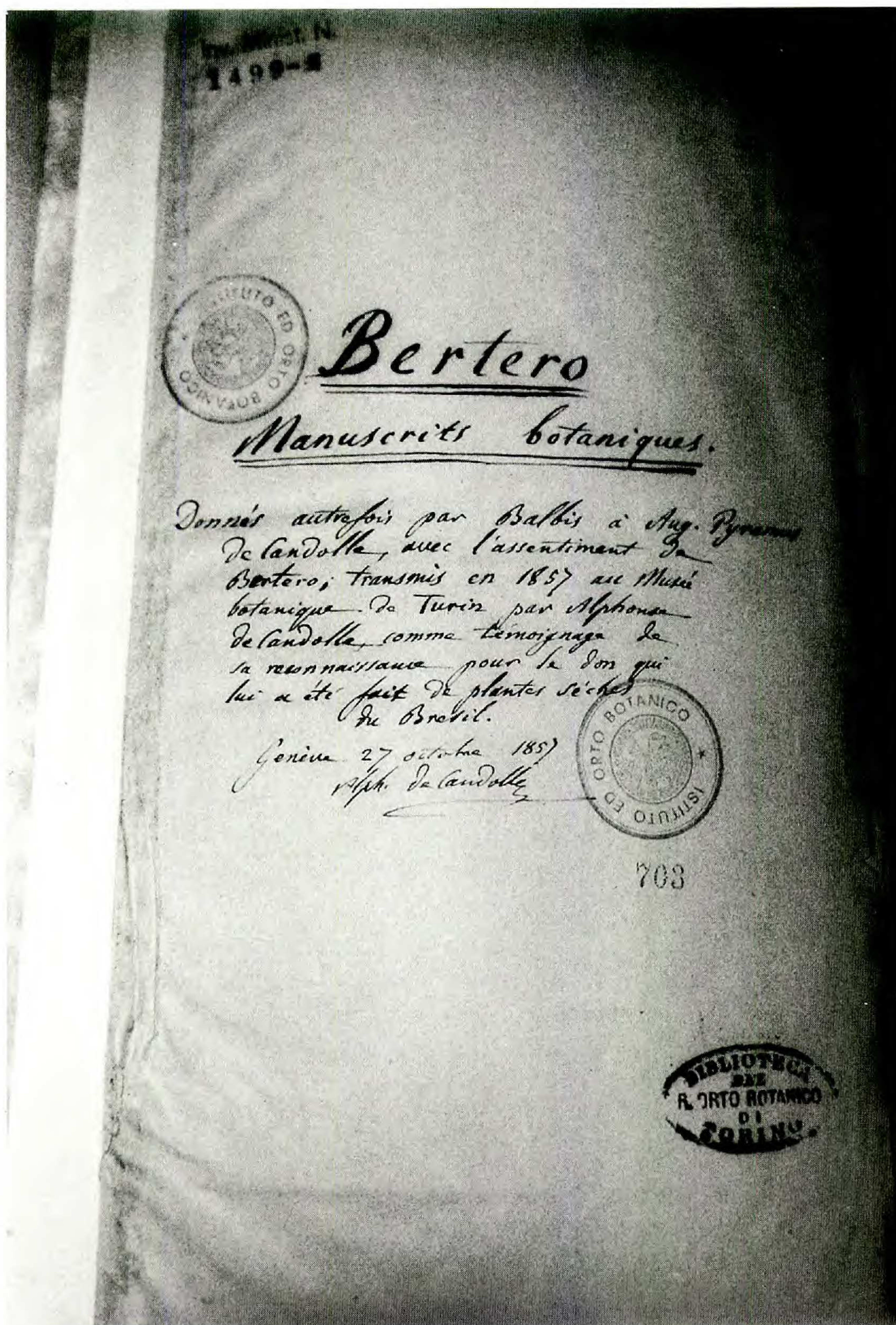


Fig. 4. Photograph of the first page of Bertero's field book, with the writing by Alphonse de Candolle: "Bertero, Manuscrits botaniques, Donnés autrefois par Balbis à Aug. Pyramus de Candolle, avec l'assentiment de Bertero, transmis en 1857 au Musée botanique de Turin par Alphonse de Candolle comme temoignage de sa reconnaissance pour le don qui lui a été fait de plantes sèches du Bresil. Genève 27 Octobre 1857, Alph. de Candolle."

temporary European botanists. These feelings were expressed in several letters, just before his departure for Chile: “... puisque je me suis de nouveau exposé à des dangers pour faire des découvertes je veux que rien ne parait ce qu'en mon nom...” [... because I have again exposed myself to dangers in order to make discoveries, I want them to appear under my name...] (Paris, 10 August 1827), and “... mon intention était de ramasser des matériaux les quels étant réputés de quelqu'intérêt je voulais les publier moi même et payer par ce moyen un juste tribut à mon amour propre...” [... my intention was to accumulate the materials that I regarded of some interest, and wanted to publish them myself and through these means pay a tribute to my self-respect...] (Paris, 18 August 1827).

Bertero's expedition to Chile, Juan Fernández Islands, and Tahiti (1827–1831)

For the second time, Bertero travelled from Paris to Le Havre, and from there, in October 1827, he embarked on a ship with destination Chile, again as a ship doctor. That would be the last time that he saw the European continent. After 112 days of sea voyage, Bertero arrived at Valparaíso, and shortly after he received permission for medical practice in the country, which allowed him to pay his travel and living expenses.

Bertero's explorations in South America turned out to be even more difficult than those he undertook in the Antilles. In fact, in his correspondence he mentioned the many obstacles that he had to overcome: endless rains, impenetrable forests, unusable roads, earthquakes, and frequent dangers of all sorts. In addition, he had to dedicate a considerable part of his time to his medical practice, which he alternated with his botanical work, and had to postpone the shipments of his specimens to Europe several times because of the obstacles encountered in several Chilean ports. To make things more complicated, Bertero travelled in Chile while the country was in revolution (Rancagua, 30 June 1828). The Chilean government contacted Bertero in order to teach a course in Botany and Agriculture, and even planned the creation of an acclimation garden, but these projects were never realized (Valparaíso, 24 June 1829).

Bertero's correspondence with Balbis and Colla includes a wealth of information related to the flora of the regions explored, and documents his travels from Europe to South America, and his life in Chile: France: Paris (25 July 1827, 8 August 1827, 10 August 1827, 18 August 1827, 26 August 1827, 14 September 1827), Le Havre (16 September 1827, 10 October 1827); Chile: Santiago de Chile (11 March 1828, 11 March 1828), Rancagua (17 May 1828, 30 June 1828), Valparaíso (21 June 1829, 24 June 1829, 6 July 1829, 28 November 1829, 28 November 1829, 6 February 1830, 6 February 1830, 6 July 1830, 26 July 1830, 7 August 1830, 10 September 1830).

Contrary to the first expedition, the information that can be extracted from herbarium labels from the second expedition cannot be easily integrated with

the data obtained from his correspondence. In fact, the collection dates of herbarium specimens are limited to the year, reducing the possibility to reconstruct the exact chronological sequence of Bertero's movements (Fig. 5). The only sure data obtained from the material preserved at TO-HG are those correlated with his collections in Valparaíso (June 1829, June–August 1830), Quillota (July 1829), and Juan Fernández Islands (July–November 1829) (Table 2). No herbarium material was found at TO-HG from the trips that he mentioned in various letters (Santiago, 11 March 1828; Valparaíso, 24 June 1829, 6 July 1829, 26 July 1830), in the surroundings of Concepción, Petorca and Coquimbo. Nevertheless, in a letter (preserved at the Academy of Sciences of Turin) he mentioned the sending of a sample of native silver, extracted from the mines of Coquimbo, to the Academy of Sciences of Turin.

In Chile, he collected mostly in the central region. First he botanized in the surroundings of Valparaíso, and then in Viña del Mar and Quillota, on his way to Santiago; from there he travelled south to Rancagua. It is still doubtful if he travelled to Concepción, Petorca and Coquimbo, which he mentions in one letter to Colla (see below). Some references related to Bertero's work in the region were published by the Royal Society of London (1867), Pritzel (1871), Saccardo (1895–1901), Vignolo-Lutati (1956), Stafleu & Cowan (1976), and Del Vitto (1986).

Bertero published an account on the Chilean plants known to him in several articles in *El Mercurio Chileno* (Bertero 1828–1829), where taxa were listed alphabetically, with notes on common names, their uses and peculiarities. This work remained incomplete, arriving only to the letter Q, and was ended with “(Se concluirá)” [to be concluded], because the publication of the journal was stopped, due to political turmoil. Bertero's articles were translated in Italian (Colla 1829a, 1829b, 1830), English (Bertero 1831, 1833) and German (Bertero 1832) immediately after their publication in Chile, and reprinted with notes by Looser (1931), proving the importance of his work. Unfortunately, Bertero's new taxa were not supplied with a description and should be treated as *nomina nuda* (invalid names according to the code of botanical nomenclature - Greuter et al. 2000). The logical continuation to Bertero's work published in the *Mercurio Chileno* is to be found in Colla's *Plantae rariores in regionibus chilensibus* (Colla 1834, 1835, 1837) and Moris' *Plantae chilenses novae minusque cognitae* (1834, 1835). Also, a few of Bertero's new taxa were described by Moris (1831, 1832, 1833) from plants grown in the Royal Botanical Gardens of Turin (from seeds sent by Bertero from Chile). In addition, Bertero's new taxa from his Chilean collections were published in the works of many botanists from all over Europe, sometimes validating his *nomina nuda*, or disregarding his proposed binomials.

In his botanical observations in Chile, Bertero was also the first to realize that *Cyttaria* (Ascomycetes, described by Berkeley, 1841) was a fungus, and not the strange “fruits” of *Nothofagus* (Minter et al. 1987).

Because of the ongoing war in Chile, he had to discontinue his medical

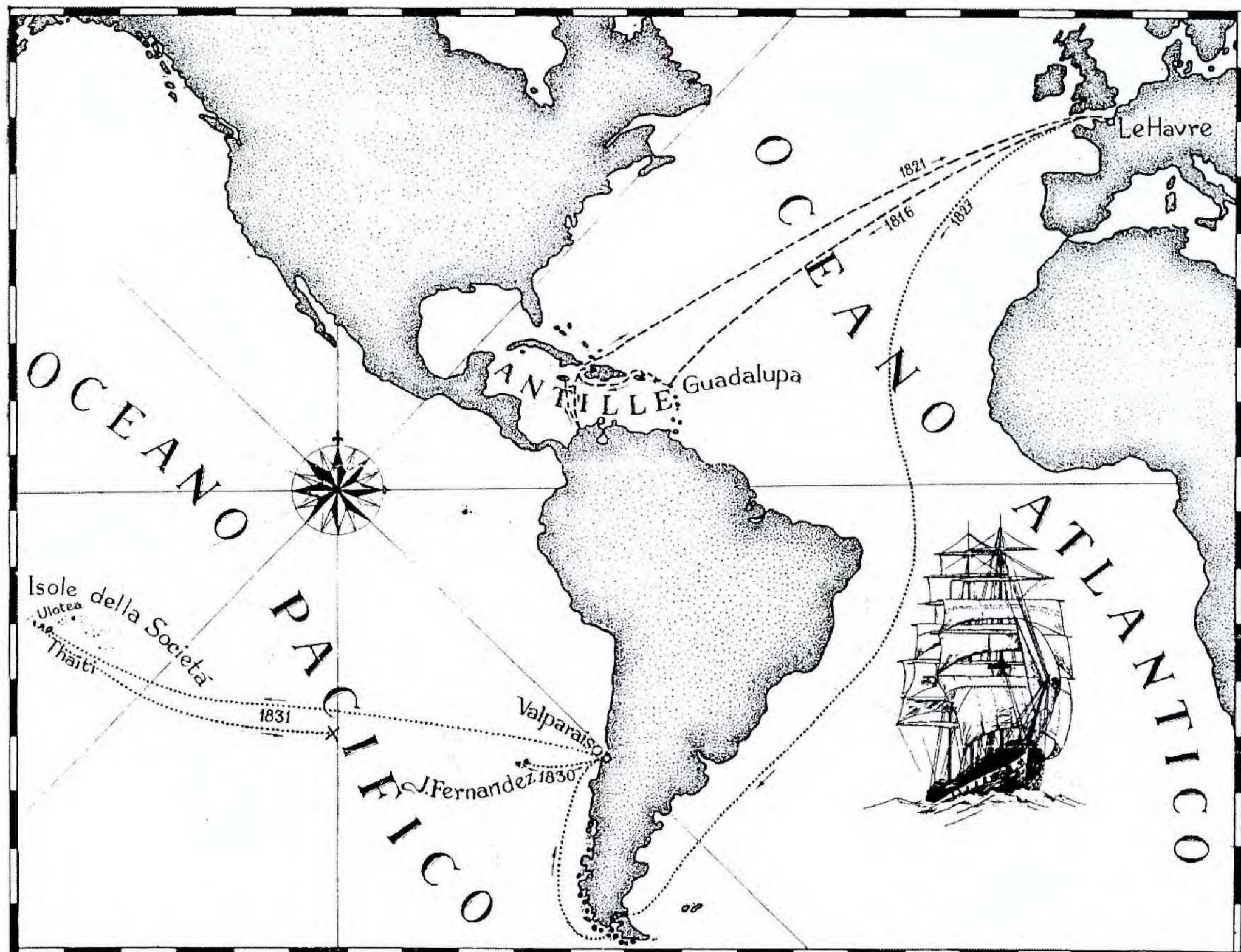


FIG. 5. Map of both Bertero's two itineraries in the Antilles and Colombia (1816–1821), and in Chile, Juan Fernández Islands, and Tahiti (1827–1831). Reproduced with permission from Molinaro (1989).

TABLE 2. Bertero's main localities and dates of his trips to Chile, Juan Fernández Islands, and Tahiti (1827–1831). Localities and periods were extracted from the letters exchanged among Bertero, Colla and Balbis, and from labels of herbarium specimens preserved at the Turin Herbarium (TO-HG).

Localities	Collection periods
Valparaíso	February 1828
Santiago	March 1828
Rancagua	March 1828–February 1829
Santiago	March–May 1829
Valparaíso	June 1829
Juan Fernandez Islands	July–November 1829
Valparaíso	December 1829–February 1830
Quillota	March–May 1830
Tahiti	November 1830–April 1831

practice. Therefore, from March to May 1830, he visited the Isla Más a Tierra, of the Juan Fernández Islands, accompanied by A. Caldeleugh, and returned to Chile with plant specimens accounting for about 300 species. Guillemín (1830)

published an extract of one letter written by Bertero, dated Valparaíso 7 July 1830, on the natural history of the Juan Fernández Islands. This account, for which Bertero should be rightly considered the author, is the first scientific observations of this archipelago. Among the plants collected by Bertero in Juan Fernandez Islands, should be mentioned the genus *Rea*, a name that he proposed in a letter to Colla (February-March 1830), and that was later published by M.J. Decaisne (1833). Unfortunately, this genus was described one year earlier by David Don (1832) as *Dendroseris*, and *Rea* should be treated as synonymous to it. Regarding the cryptogams collected by Bertero in Juan Fernandez Islands, the vast majority of the new taxa were described by Camille Montagne (1835a, 1835b).

On 28 September 1830, Bertero sailed from Chile, with the General Consul of North America J.A. Morenhout, to the Society Islands and arrived at Tahiti on 4 November 1830. Detailed information on Bertero's trip to Tahiti was supplied in a letter written by Morenhout (25 March 1832; Vignolo-Lutati 1956). According to Morenhout, as Bertero arrived in Tahiti, he immediately started actively botanizing and made substantial collections. A few months later, as he received news about the ongoing revolution in France, Bertero sailed on a small boat (of Morenhout's property) directed to Valparaíso on 2 April 1831, leaving his Tahitian collections to Morenhout, and arriving on the same day at the small island of Raiatea (Society Islands), where he made his last botanical collections. From Raiatea, Bertero wrote two letters (2 April 1831 to Colla, and 9 April 1831 to Morenhout); these were his last communications, at the young age of 42. In his last letter to Colla, probably feeling a premonition of his imminent death, Bertero wrote: "Adieu, bonne Santé, un Pater et un Ave pour mon âme dans le cas qu'elle soit submergée!" [Good bye, and good health, recite a Pater Noster and an Ave Maria for my soul in case that it will be sunk!].

Almost one year later, after loosing any hope of Bertero's survival, Morenhout wrote a long letter (25 March 1832) to the Academy of Sciences of Turin, where he informed them of Bertero's disappearance, and of his grand future plans to explore Peru, return to Colombia, and start his explorations in North America. Morenhout concluded his letter with the following sad notes (free translation from French): "Destiny has not permitted that he [Bertero] realized his grand projects, as he never stopped loving his interesting research! He deserves the sorrow of all his friends in science, and most of all from You, Sirs [the members of the Academy of Sciences of Turin], and from his homeland that he always fondly remembered. Honoured by his friendship, I have known the most intense sentiments of his soul, and I know that he had no other passion than Botany nor other ambition than being proud of You and his Homeland!"

While still in Chile, Bertero sent his collections to Baron Delessert at Paris, who took the responsibility of distributing duplicate sets to Balbis (now at TO-HG), Colla (now at TO-HG) and A.P. de Candolle (G-DC), keeping one for him-

self (G-DEL), and conserving the rest for the return of Bertero, as he explained in several letters from Paris (10, 18, and 26 August 1827) and from Valparaíso (24 June and 6 July 1829). Fearing that some of the boxes might become lost, Bertero also planned duplicate sets to be sent directly to Balbis (Paris, 26 August 1827). Such a plan was not followed, however, because Bertero did not receive any communications from Balbis for more than a year and a half. The last letters sent from Balbis were dated 3 August 1828 and 31 January 1829, which were delivered contemporarily to Bertero on June 1829 (Valparaíso, 24 June 1829).

Bertero's entire collection from Chile—approximately 15,000 specimens—was sold by Delessert's heirs at an auction, several years after Bertero was declared lost at sea. The collection was bought for 1,200 Francs by the travel company *Unio Itineraria* ("Reise Verein"), based at Esslingen (Germany) and owned by E. Steudel and C.F. Hochstetter. *Unio Itineraria* dismantled Bertero's Chilean collection, and sold the duplicate sets to the institutional herbaria of Berlin (B), the British Museum of London (BM), Kew (K), Leiden (L), Nancy (NCY) and Paris (P), and to the personal herbaria of E. Cosson (now P), B. Delessert (G-DEL), A.P. de Candolle (G-DC), J. Cambessèdes (now at MPU), A. Wigand (now at MB), and probably some others. According to Turrill (1920), 5,000 specimens are preserved in the Paris herbarium (P), with labels reporting localities of collection and accurate descriptions. Other than those indicated above, additional Bertero's Chilean collections are found at A, CGE, CN, E, F, FI, G, GH, KIEL, LE, M, MEL, MO, NY, OXF, PC, SGO, TCD; and those from Juan Fernández Islands at B, F, G, GH, K, L, MEL, MPU, NY, P, P-JU, PC, SGO (Lanjouw & Stafleu 1954, and pers. obs.).

In 1834, Morenhout sent Bertero's Tahitian collections to Alcide Dessalines d'Orbigny (1802–1857) who travelled in South America in 1826–1834 (Orbigny 1834–1847), at Paris in a large crate. As the crate arrived at his destination, it was noticed that it had been opened, and part of its contents was missing. A detailed account on the Tahitian collection made by Bertero and Morenhout sent to d'Orbigny, as well as descriptions of many new species, was published by J.A. Guillemin (1836, 1837). In the first article of the series, Guillemin stated that duplicates of these collections were sent to the Museum of Natural History of Paris (P), to the Royal Academy of Turin (which material has been entirely transferred to the herbarium of the University of Turin, TO), and to the personal herbaria of A.T. Brongniart (now at P) and B. Delessert (now at G-DEL), and other non specified botanists. More research on the distribution of duplicates of Bertero's Tahitian collections is necessary (none cited by Lanjouw & Stafleu 1954). Nevertheless, specimens of his Tahitian incomplete sets were found in Paris (P), Berlin (B, destroyed), Kew (K), and at the Delessert herbarium (G-DEL). Only four specimens of Bertero's Tahitian collections were found at the Turin herbarium (TO-HG), and no reference to them could be found in the correspondence.

Additional references about the distribution of Bertero's collections can be

found in: Anonymous (1833), Lasègue (1845), Caruel (1874), Parlato (1841, 1874), Saccardo (1895–1901), Urban (1902), Mattiolo (1907), Ciferri (1931), Martelli (1931), Vignolo-Lutati (1931b), Lanjouw & Stafleu (1954), Del Vitto (1986), Matthei (1986), Rodriguez Rios (1986), and Del Vitto et al. (1993).

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